We claim:

1. A linear alpha-olefin dimer made by a process comprising coupling of an initial olefin and a second olefin.

2. The dimer of claim 1 made by said process wherein said coupling is head to head coupling accomplished by 1, 2 insertion in the initial olefin followed by 2,1 insertion in the second olefin resulting in a complex which beta-eliminates to produce said linear dimer.

3. The dimer of claim 2 made by said process wherein said coupling further results in byproducts comprising methyl-branched olefin dimers.

4. The dimer of claim 3 made by said process wherein said byproducts of said process further comprise olefin trimers.

5. The dimer of claim 2 made by said process wherein said byproducts of said process comprise less than about five percent vinylidene or tri-substituted olefins.

6. The dimer of claim 2 made by said process wherein said coupling further results in byproducts comprising vinylidene.

7. The dimer of claim 1 made by said process wherein said initial olefin is butene and said second olefin is butene and said dimer is a 1-butene dimer.

8. The dimer of claim 1 made by said process wherein said initial olefin and said second olefin are selected from the group consisting of alpha olefins consisting of about five to about eight carbon atoms.

9. The dimer of claim 1 made by said process wherein said initial olefin and said second olefin are selected from the group consisting of alpha olefins consisting of about nine or more carbon atoms.

10. The dimer of claim 2 made by said process wherein said coupling is facilitated with an activated transition metal-based catalyst and said complex is an organo-metallic complex.

11. The dimer of claim 10 made by said process wherein said transition metal-based catalyst is an iron-based catalyst activated with an aluminum-based co-catalyst.

12. The dimer of claim 10 made by said process wherein said transition metal-based catalyst is a nickel or cobalt-based catalyst.

13. The dimer of claim 10 made by said process wherein said transition-metal based catalyst is highly active.

14. The dimer of claim 10 made by said process wherein said transition metal-based catalyst is selected from the group consisting of structures 1, 2, 3, 4, 5, and 6:

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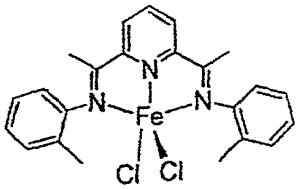

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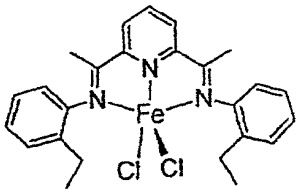

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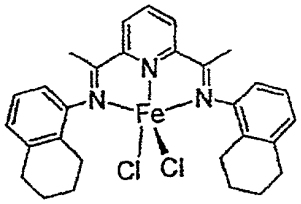

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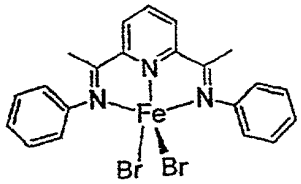

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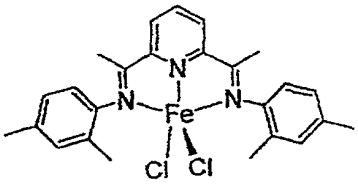

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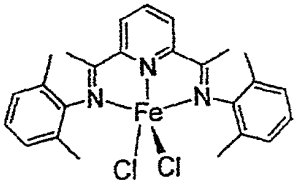

15. The dimer of claim 14 made by said process wherein said aluminum-based co-catalyst is selected from the group consisting of alumoxane and Lewis acid/trialkylaluminum.

16. The dimer of claim 2 made by said process wherein said coupling is accomplished at temperatures ranging from about 0 degrees Centigrade to about 80 degrees Centigrade.

17. The dimer of claim 2 made by said process wherein said coupling is accomplished at temperatures exceeding about 80 degrees Centigrade.

18. The dimer of claim 2 made by said process wherein said coupling is accomplished in an inert atmosphere.

19. A feedstock for the production of oxoalcohols comprising the dimer of claim 1.

20. A method for making alpha-olefin dimers comprising adding olefin feedstock to an activated catalyst and allowing same to react so that a 1, 2 insertion is made in a first olefin and a 2,1 insertion is made in a second olefin followed by beta elimination such that head to head coupling of the two olefins occurs.

21. The method of claim 20 wherein said dimers consist of linear alpha olefin dimers and mono-branched alpha olefin dimers.

22. The method of claim 20 wherein said dimers consist of linear alpha olefin dimers and a principal byproduct.

23. A linear 1-butene dimer product of a process comprising head to head coupling of an initial olefin and a second olefin where said coupling is facilitated by an activated iron-based catalyst such that there is a 1, 2 insertion in the initial olefin and a 2, 1 insertion in the second olefin resulting in an organo metallic complex which beta-eliminates to produce said dimer.

24. The 1-butene dimer of claim 23 made by said process which also produces methyl branched heptene.

25. The 1-butene dimer of claim 23 of said process where said catalyst is activated by an aluminum-based co-catalyst.

26. The 1-butene dimer of claim 25 made by said process where said iron-based catalyst is a pre-catalyst selected from the group consisting of structures 1, 2, 3, 4, 5, and 6 and said co-catalyst is an alumoxane or a Lewis acid/trialkylaluminum:

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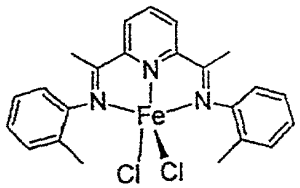

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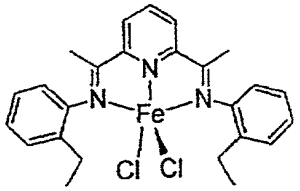

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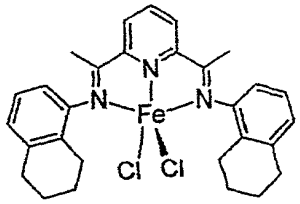

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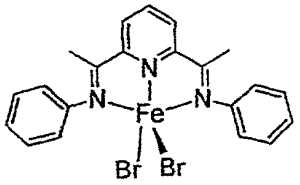

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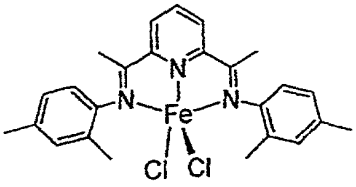

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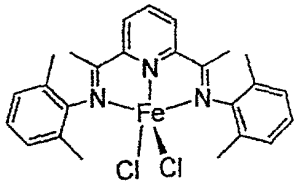

27. The 1-butene dimer of claim 23 made by said process where said process is conducted at temperatures ranging from about 0 degrees Centigrade to about 80 degrees Centigrade in an inert atmosphere.

28. The 1-butene dimer of claim 23 made by said process wherein butene is recycled in said process for making said 1-butene dimer.